DAG 1066: A NEWFOUND ANOMALOUS UREILITE WITH CHONDRITIC INCLUSIONS

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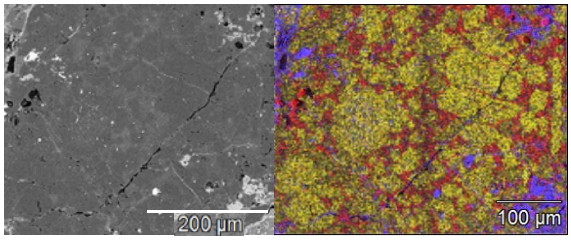
Introduction: DaG 1066 is a new meteorite found in 1999 by Romano Serra during expedition for meteorite search in the Dar al Gani rocky desert area of Libya. The meteorite consists of four fragments, totally weighing 125 g, each one partially covered by fusion crust. A cut surface on one side reveals an achondritic texture. The type specimen (21.3 g) is on deposit at Museo di Storia Naturale dell'Università di Firenze, Florence, Italy. The Museo del Cielo e della Terra (OAM), Bologna, Italy, holds the main mass and a polished thin sections.

Description: A thin section of the meteorite shows a coarse-grained matrix surrounding various inclusions of different lithologies. The matrix is mainly composed by olivine crystals from 0.2 to 1.5 mm of size and minor pyroxene and feldspar. Olivine crystals are zoned, with Mg-rich rims. Opaque phases are pentlandite, FeNi metal, silicides (suessite Fe_3Si, hapkeite Fe_2Si, naquite FeSi), present as tiny inclusions along olivine grain boundaries, and graphite. Most of the inclusions are fine-grained ureilitic aggregates, consisting of 90% olivine crystals separated by a diopsidic, Al-rich clinopyroxene. Two inclusions are metal-rich, display fine grained (max. width 50 microns) textures and contain 60% vol. Fe-rich olivine crystals, 20 % Al-rich clinopyroxene and 20 % opaques, consisting of equal parts of Fe-Ni alloy and pentlandite. Two inclusions are chondrules made of forsteritic olivine and enstatitic pyroxene, with no opaques. EMPA analyses performed on silicates of the matrix and on the inclusions confirmed that some inclusions are ureilitic (matrix: olivine $Fa_{3.0\text{-}26.8}$, pigeonite $Fs_{14.1}Wo_{7.3}$; ureilitic inclusions: olivine $Fa_{26.4,}$ pigeonite $Fs_{22.6}Wo_{7.3}$) while other are CC-like clasts ($Fa_{39.8}$; Fe/Mn = 94.7; Al-rich clinopyroxene: TiO_2 = 0.3, Al_2O_3 = 8.4, Cr_2O_3 = 2.1, Na_2O = 4.2, all in wt.%) or Fo,En-rich chondrules (olivine $Fa_{0.3\text{-}3.0}$, enstatite $Fs_{0.8}Wo_{2.5}$).

Conclusions: Although the presence of silicides [1,2,3,4,5], and of clasts of enstatite grains from E-chondrites, aubrites, CC matrix-like materials, angrites and R-chondrites, as well as chondrules from type 3 OC [6,7,8], has already been reported in polymict ureilites, the compositional variability of silicides and the presence of a chondrule made of extremely reduced components (figures 1 and 2) was not reported to the best of our knowledge.



Figures 1 and 2: SEM-BSE image and X-ray map of the chondrule in DaG1066; Mg = yellow, Fe = purple, Al = red.

References: [1] Ikeda Y. (2007) Polar Science, **1**, 45; [2] Herrin J.S. et al. (2007), *LPSC* **38**, abs. 2404; [3] Ross A.J. et al. (2010) *LPSC* **41**, abs. 2361; [4] Smith C.L. et al. (2010), *M&PS* **45**, Suppl. A192; [5] Bishoff A. et al. (2010), *M&PS* **45**, 10-11, 1638 [5] Moggi Cecchi et al. (2011), *M&PS* **46**, 7, S, A165; [6] Goodrich C.A. et al. (2004) *Chemie der Erde* 64, 283. [7] Downes H. et al. (2008) *GCA* 72, 4825.[8] Goodrich C.A.& Gross J. (2015), *LPSC* **46**, abs. 1214.